

REMARKS

Reconsideration and allowance are respectfully requested.

Claims 4-6, 8-11 and 24-25 are pending.

The amendments are fully supported by the original disclosure and, thus, no new matter is added by their entry. For example, the three oxygens are bonded to the interior surface of the support matrix. Support for this limitation is found in “immobilization of the metal complexes inside the porous matrices, . . . whereby the transition metal complex being covalently or coordinately bonded to the interior face of matrices only” (page 4, lines 3-6, of the specification). The valence of the Group VIII metal M and Formula II support the phosphine ligand L_x with x being an integer in the range from 1 to 4.

Specification/Claim Objections

The examples are renumbered to address the Examiner’s objection to the specification.

Claims 24-25 replace claims 1-2. The spelling of “mesoporous” is corrected. But Applicants disagree with the suggestion to replace “group VIII” with --groups 8-10--. The former term is not ambiguous because the Examiner (as well as persons skilled in the art) would know exactly what is meant by the term, and Group VIII is preferred because it is supported by the disclosure as originally filed.

Withdrawal of the objections is requested.

35 U.S.C. 112 – Written Description

Claims 1-2, 4-6 and 8-11 were rejected under Section 112, first paragraph, because it was alleged that they contain “subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.” Applicants traverse.

Z is $-NH_2$ to conform the scope of the product and process claims with each other. The three oxygens bonded to the silicon atom are also bonded to the interior

surface of the support matrix. With regard to the stability of the metal atom, the phosphine ligand may be repeated up to four times.

Withdrawal of the written description rejection made under Section 112, first paragraph, is requested.

35 U.S.C. 112 – Definiteness

Claims 1-2, 4-6 and 8-11 were rejected under Section 112, second paragraph, as being allegedly “indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.” Applicants traverse.

The three oxygens bonded to the silicon atom are also bonded to the interior surface of the support matrix. With regard to the stability of the metal atom, the phosphine ligand may be repeated up to four times.

The Examiner’s suggestion for amending claim 1 is incorporated in new claim 24.

Z is $-NH_2$ to conform the scope of the product and process claims with each other. The Examiner’s suggestion for amending Formula II is incorporated in new claim 25. With regard to the stability of the metal atom, the phosphine ligand may be repeated up to four times.

Antecedent basis in claim 9 is corrected.

Applicants request withdrawal of the Section 112, second paragraph, rejection because the pending claims are clear and definite.

35 U.S.C. 103 – Nonobviousness

To establish a case of prima facie obviousness, all of the claim limitations must be taught or suggested by the prior art. See M.P.E.P. § 2143.03. Obviousness can only be established by combining or modifying the prior art teachings to produce the claimed invention if there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to a person of ordinary skill in the art. See, e.g., *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Jones*, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992). It is well established that the mere fact that references can be combined does not render the resultant combination obvious unless

the desirability of that combination is also taught or suggested by the prior art. See *In re Mills*, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990). Thus, even if all elements of the claimed invention were known, this is not sufficient by itself to establish a prima facie case of obviousness without some evidence that one would have been motivated to combine those teachings in the manner proposed by the Examiner. See *Ex parte Levengood*, 28 USPQ2d 1300, 1302 (B.P.A.I. 1993).

Evidence of the teaching, suggestion or motivation to combine or to modify references may come explicitly from statements in the prior art, the knowledge of a person of ordinary skill in the art or the nature of the problem to be solved, or may be implicit from the prior art as a whole rather than expressly stated in a reference. See *In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999); *In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). Rigorous application of this requirement is the best defense against the subtle, but powerful, attraction of an obviousness analysis based on hindsight. See *Dembiczak* at 1617. Whether shown explicitly or implicitly, however, broad conclusory statements standing alone are not evidence because the showing must be clear and particular. See *id.*

Finally, a determination of *prima facie* obviousness requires a reasonable expectation of success. See *In re Rinehart*, 189 USPQ 143, 148 (C.C.P.A. 1976).

Claims 1-2, 4-6 and 8-11 were rejected under Section 103(a) as allegedly unpatentable over Dai, JP, Gryaznov, and Pugin. Applicants traverse.

Dai does not disclose a composition comprising microporous material. Instead, Dai discloses a process for preparation and synthesis of mesoporous substrates by molecular imprinting. Column 2, line 12, of Dai clearly teaches the drawbacks of prior art bulk molecular imprinting, which involves mass transfer through non-polar microporous channels and results in unfavorable sorption and desorption kinetics. Column 2, lines 39-45, of Dai also teaches the beneficial properties of mesoporous substrates including optimum diameters that match the stereochemical requirements of for surface imprinting of 4-6 coordinated metal ions. Dai further teaches bifunctional ligands attached to the surface of the mesoporous substrate. But Dai does not disclose the bonding of organo-metallic complexes to the interior surface. Similarly, JP does not disclose the bonding of

organometallic complexes to the interior surface. But this feature of Applicants' invention is recited as a limitation of the claims.

In Applicants' invention, organometallic complexes (transition metal complexes containing a semilabile anionic chelating ligand N-O) are bound to amino functionalized surface tethering groups. In particular, Applicants' claimed process recites "pretreating a solid matrix with exterior surface and interior surface, by blocking the exterior surface using a blocking agent in a solvent system leaving the interior surface undisturbed" and "functionalizing the interior surface of the solid matrix with a functionalized silane having a general formula of $Z-(CH_2)_p-Si(OR)_qH_{3-q}$, wherein Z is $-NH_2$, p is an integer in the range from 2 to 6, OR is an alkoxy group, and q is an integer in the range from 1 to 3." Both Dai and JP fail to teach or suggest the use of a blocking agent to block the exterior surface such that only the active sites of the interior surface are functionalized and available for bonding to an organometallic complex. In Applicants's claimed process, the latter is accomplished "by treating the functionalized matrix with a transition metal complex solution of Formula II . . . to immobilize the complex to the interior of the solid matrix, to obtain the immobilized metal complex catalyst."

In JP, the metal catalyst carries a noble metal on the surface of silica. The thickness of the carrying layer in JP can be controlled, thereby leading to a clear showing that the metal is fixed to the exterior surface. As explained above, there is also no disclosure of the use of blocking agents to block the exterior surface such that only active sites on the interior surface are functionalized and available for bonding to an organometallic complex. Applicants further advise that the use of blocking agents in organic synthesis cannot be equated to use of blocking agents in the instant invention. In fact, the use of blocking agents is non-conventional in catalyst chemistry.

Gryzanov discloses a membrane catalyst selectively permeable to hydrogen. The membrane catalyst consists of a porous material such as stainless steel, copper, or nickel that is used as a substrate, a polyorgano siloxane polymer, and a heterogenized palladium complex. Vulcanization is carried out to form a film with a thickness of 0.3 - 1.0 mm. In the instant invention, the immobilized catalyst consists of a silaceous or aluminated mesoporous or microporous substrate, a dialkyl or diaryl substituted dihalo-

silane as blocking agent, an organic solvent, and a transition organometallic complex bound to an amino functionalized surface tethering group.

Applicants' invention uses alkyl ethoxysilanes with an amino group as the functionalizing linkers. Pugin uses alkyl triethoxysilane linkers with an isocyanate group. In Pugin, the method involves immobilization of chiral diphosphine ligands bearing a $-NH_2$ or $-OH$ group on inorganic supports using the isocyanate silane linkers. Applicants' claimed process uses alkyl ethoxysilanes with an amino group to immobilize a transition organometallic complex containing a semilabile anionic chelating ligand N-O to the interior surface of silaceous or aluminated mesoporous or microporous substrate.

Therefore, Applicants submit that the combined teachings of the cited documents would not provide sufficient motivation or suggestion to a person of ordinary skill in the art to arrive at their claimed invention.

Withdrawal of the Section 103 rejection is requested because the invention as claimed would not have been obvious to a person of ordinary skill in the art at the time it was made.

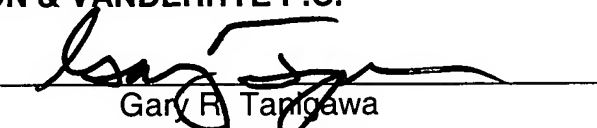
Conclusion

Having fully responded to all of the pending objections and rejections contained in this Office Action, Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The Examiner is invited to contact the undersigned if any further information is required.

Respectfully submitted,

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